

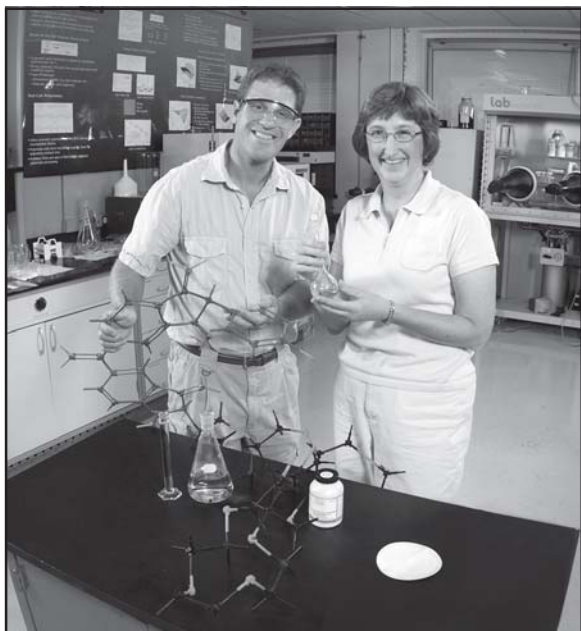
AEROSPACE
Frontiers

Volume 7 Issue 8 September 2005

Glenn receives four *R&D 100*
"Oscars of Invention"

BY S. JENISE VERIS

Guided by NASA's quest for exploration, Glenn researchers have developed technologies that will not only address the needs of the Nation's goals for space exploration, but also improve the quality of life on Earth. Four of these Glenn-developed technologies are among the world's Top 100 technologies recognized with an R&D 100 award—commonly referred to as an Oscar of Invention—determined by a panel of outside experts and the editors of R&D 100 magazine. Congratulations to:



C-2005-1167

Photo by Quentin Schwinn

R&D 100 winners Dr. Kinder and Dr. Meador are pictured with their award-winning polymers in their laboratory at Glenn.

Dr. Mary Ann Meador and Dr. James Kinder, Materials Division, developed a family of polymers called rod-coil block copolymers to improve ionic conductivity for lithium polymer batteries. The rod portion provides mechanical integrity while the coil acts as a carrier for a variety of ions. These polymers offer cost-saving features widely recognized for practical applications of lithium polymer batteries such as mobile phones and credit cards, or protons used in fuel cells. They also offer lower manufacturing costs and increase battery safety to meet future aerospace application requirements, e.g., planetary orbiters; landers and rovers; low-Earth orbiting spacecraft; astronaut equipment; and reusable launch vehicles. Space Act Agreements with Eveready

Battery Company and Ferro Corporation are ongoing to commercialize this material.

Most fire detectors sense smoke particles; which occasionally may be fooled by dust and other tiny airborne particles, thereby leading to false alarms. A new sensor-based system developed at Glenn is so sensitive that it may reduce false alarm rates of fire detectors in commercial airliners, with adaptability for the International Space Station.

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Return to
Flight!

NASA returned to flight with the STS-114 crew of the Space Shuttle *Discovery*—left to right, front to back, James Kelly, Eileen Collins, Wendy Lawrence, Charles Camarda, Soichi Noguchi, Andrew Thomas, and Stephen Robinson—on July 26. Learn how Glenn contributed to this historic mission (pages 6–7).

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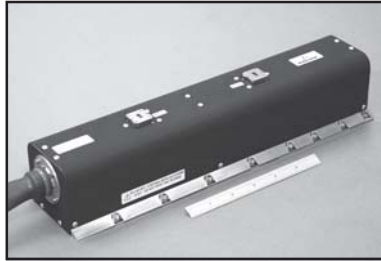
NEW FACILITY 9
Test will meet space exploration applications milestone

Research Highlights

The following are a few recent Exploration Systems Division milestones.

TWT demonstrates record power levels

Glenn, the Jet Propulsion Laboratory (mission lead center), and L3 Communications Electron Technologies are pushing the limits on efficiently transmitting more data to the ground for NASA's space exploration missions. In May, L3 Communications successfully completed performance testing of the high-power, high-efficiency Ka-Band space traveling wave tube (TWT) at 180 watts. The completion of this milestone marks the highest power space TWT manufacturing and testing ever conducted. It has successfully demonstrated 18 times more power, a 50 percent increase in power efficiency, and 100 percent more data bandwidth than the state-of-the-art Cassini TWT. NASA's advances in TWT technology, including Glenn's two decades of experience in TWT modeling and design, will improve the speed and efficiency of data communications enabling real-time, high-resolution video transmission from space. These results translate into higher data transmission rates from greater distances, more flexibility, and more channels available for space communications. For more information, visit http://esd-internal.grc.nasa.gov/Media/Articles_Media/Article-TWT.htm or contact Dr. Rainee Simons, 216-433-3462.



High Power TWT Final Package Assembly (size: 8 cm by 8 cm by 36 cm, weight: 1500 grams).

ISS flight training hardware to Johnson



FCF Crew Training Units Development Team, left to right: David Lamar, FCF training manager; Tracy Neff (HEI), FCF CTU lead engineer; Tony Johnson (HEI), FCF CTU project manager.

Astronauts bound for the International Space Station (ISS) will soon receive state-of-the-art training on Glenn's new Fluid Combustion Facility (FCF) Crew Training Units (CTU). On May 31, the Mission Operation and Integration Projects Office delivered the training racks to Johnson to be added to the Space Station Mockup Training Facility's Destiny Science Module. The CTUs are detailed, high-fidelity, yet lightweight versions of the two-rack FCF flight hardware used to study fluid physics and combustion science in microgravity. Each component has been tested for safety, maintainability, and structural integrity to ensure that they will last for up to 15 years. Beginning in spring 2006, two crews per year will be trained on the CTUs in preparation for flights on the ISS. For more information, visit http://esd-internal.grc.nasa.gov/Media/Articles_Media/Article-HiFilSS.htm or contact David Lamar, 216-433-6020.

JIMO precursor ion thruster 2000-hour wear test

On June 19, Glenn completed a 2000-hour wear test of the High Power Electric Propulsion (HiPEP) ion thruster in Vacuum Facility 6. The HiPEP engine, developed by the Electric Propulsion Branch and managed by the Nuclear Technology and Demonstration Project Office, is one of the two precursor ion thrusters produced in support of the Prometheus Jupiter Icy Moons Orbiter (JIMO) mission. Completion of this milestone marks the first in a series of long-duration tests required to develop and qualify JIMO-class ion thrusters. The wear test engine was run at 20.8 kW, which is roughly 10 times the power of state-of-the-art ion thrusters. The test demonstrated the operational viability of pyrolytic graphite ion optics (the accelerating mechanism) and of a rectangular-shaped engine for high-power ion thrusters that could enable more demanding exploration missions. For more information, contact Fred Elliott, 216-433-2322.

iTA takes new direction

In response to Administrator Michael Griffin's quest to achieve a better balance between decision-making authority at Headquarters and at the centers, NASA's Chief Engineer Rex Geveden has refined the policy and approach for the Independent Technical Authority (iTA). Earlier this year, NASA implemented the iTA process to ensure future missions are safe and reliable. (See *AeroSpace Frontiers*, July 2005 issue.)

NASA has refined the policy and approach for the Independent Technical Authority.

"The changes to the iTA process ensure the centers' accountability and focus for project technical decision-making and a more practical role for the NASA Engineering Safety Center (NESC)," explained Glenn's Chief Engineer Jose Vega.

Now, implementing iTA is redelegated to center directors with process approval by the chief engineer, which is consistent with the Columbia Accident Investigation Boards' recommendation. Center directors will also select systems warrant holders and discipline leads, who will have decision-making authority on program/project technical matters—except for variances to NASA standards. The NESC will coordinate and manage the Discipline Technical Warrant Holders' iTA activities, which allows it to take advantage of its efficient operations and existing expertise in order to mitigate any confusion between the two programs.

To ensure Glenn receives 100 percent Centerwide compliance of

Continued on next page

R&D 100 awards

Continued from page 1

Dr. Gary Hunter, Sensors and Electronics Branch, leads the team at Glenn that used microelectromechanical systems (MEMS) expertise to develop a new, multi-sensor system that includes miniaturized carbon monoxide and carbon dioxide sensors, a smoke particle detector, and integrated software to effectively recognize the presence of fire while screening out false alarms (see page 12 for more details and team photo).

NESSUS (Numerical Evaluation of Stochastic Structures Under Stress) is a modular computer software system that combines state-of-the-art probabilistic algorithms with general-purpose numerical analysis methods to compute engine response and reliability. Initially developed by Southwest Research Institute (SwRI) for NASA, the software system was significantly enhanced by the support it received from a number of organizations, including NASA Glenn, Los Alamos National Laboratory (LANL), and Mustard Seed Software (MSeed). Glenn's Dr. Shantaram Pai, Structures, Mechanics and Dynamics Branch, was technically responsible for developing the probabilistic heat transfer module integrated in the system. Pai also managed integration of nine other NASA-developed modules into NESSUS enabling analysis of a diverse range of problems such as aerospace and automotive structures, biomechanics, gas turbine engines, geomechanics, rotordynamics, and more.

Dr. Mrityunjay "Jay" Singh and Tarah Shpargel, QSS/Ceramics Branch, were among the 200 Glenn employees who devoted extraordinary effort to aid NASA's successful return to flight. Singh led the development and efforts to manufacture GRABER (Glenn Refractory Adhesive for Bonding and Exterior Repair) material that was a candidate for the on-orbit repair kit. GRABER has since been tested as an adhesive or sealant in several other repair concepts being explored in the Thermal Protection System Repair Research and Development Program. This makes Singh's fourth R&D 100 Award—an exceptional effort and distinctive record. ♦



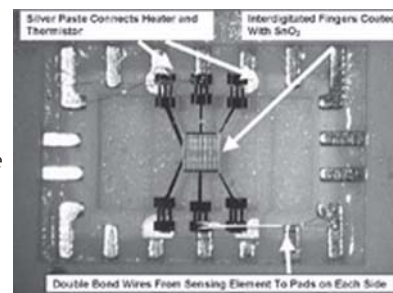
C-2005-1157 Photo by Marvin Smith
Dr. Singh and Shpargel working with GRABER in their Glenn laboratory.

Glenn's Technology Transfer and Partnership Office manages the R&D 100 awards program. For more information on the program, contact Laurel Stauber, 216-433-2820.



NESSUS 8.2 developers, left to right: David Riha, SwRI; Simeon Fitch, MSeed; Jason Pepin, LANL; Dr. Pai; Dr. Ben Thacker, SwRI; Jason Pleming, SwRI; and Edward Rodriguez, LANL.

A new sensor-based system developed at Glenn is so sensitive that it may reduce false alarm rates of fire detectors in commercial airliners.



iTA changes ensure Center accountability

Continued from page 2

iTA program awareness by September 30 (FY05), Vega is currently conducting a train-the-trainer program according to a very aggressive time schedule. He will train civil servant supervisors and contract supervisory personnel in each of the four technical directorates based on a program developed by Headquarters, which includes a (1) 10-minute DVD; (2) PowerPoint presentation on iTA; (3) manager facilitator's guide and fact sheet; and (4) standard brochure from Headquarters. The supervisors, in return, will train the remaining technical staff. Nontechnical personnel will be trained at a later date.

Look for iTA training updates on Today@Glenn. For more information or questions on the iTA process and implementation, call Jose Vega, 216-433-5453. ♦

2005 Glenn Combined Federal Campaign

Chair: Bernice Beznoska
Co-chair: Eric Overton



Kickoff—Wednesday, September 21 at 1 p.m., Building 3 Auditorium

Pacesetter Campaign—September 21 through October 5

Agency Fair—Thursday, September 22 and Friday, September 23, Building 15

Special Event—Wednesday, October 5, Car Show/Ice Cream Social/Hot Dog Cookout—Picnic Grounds

Basket Raffle—Thursday, October 20, Building 15

Retirees and contractors may also contribute to the CFC by contacting Blanche Preusser at 216-433-2528.

News and Events

Scales send off



C-2005-1191

Photo by Quentin Schwinn

On Tuesday, August 16, Glenn treated the Director of the Center Operations Directorate Charles Scales to a fond farewell as he prepared to return home to Alabama and a new position at Marshall Space Flight Center. Center Director Dr. Julian Earls expressed his appreciation for Scales' professionalism and ability to bring structure to the Operations position during the Center's period of transition. The event also included presentations from representatives from each of the four divisions under Scales' supervision. Speakers fondly recalled events and conversations with Scales, offered good-humored gifts related to Cleveland, and applauded him on surviving the city's record-breaking snowfall. Scales is pictured with Mary Lester, chief, Logistics and Technical Information Division, receiving a Cleveland Browns mouse pad that was modified to include the Center Operations logo.



Mark your calendars. . . NASA Night at Jacobs Field

Join your coworkers on Thursday, September 29, for a special NASA Night at Jacobs Field, when the Cleveland Indians host the Tampa Bay Devil Rays at 7:05 p.m. Cleveland Astronaut Carl Walz will throw out a ceremonial first pitch.

Half-off tickets can be ordered using a form that is available in the Exchange Store. Look for details on *Today@Glenn*. Don't miss the home stretch towards the playoffs!

Dewine visits



C-2005-1188

Photo by Marvin Smith

Senator Mike Dewine visited NASA Glenn on August 3 to discuss the NASA Reauthorization Act (S. 1281). Pictured, left to right, are Legislative Assistant to Senator Dewine, Kevin King; Center Director Dr. Julian Earls; Senator Dewine; and Deputy Director Rich Christiansen.



Photo by S. Jenise Veris

Educator astronauts

During the first week of August, 17 of the 200 outstanding teachers identified in NASA's Educator Astronaut nationwide application process participated in a workshop hosted by Glenn's Educational Programs Office. The teachers, finalists from Glenn's six-state region, are part of NASA's new Network of Educator Astronaut Teachers (NEAT), which was established to maintain a unique connection between the Nation's space program and the classrooms. The week's activities included exchanging innovative lessons and teaching techniques related to space exploration such as rocket building and launching, solar system walk, and amusement park physics, as well as Glenn facility tours. Frank Gati, Mission Operations and Integration Projects Office, is pictured highlighting features of the Glenn-developed Combustion Integration Rack and Fluids Integration Rack for International Space Station experiments to a group of NEAT participants.

Center Director's Message

Dear colleagues and retirees:

"You are the key" is the theme of the 2005 Northeast Ohio Combined Federal Campaign (CFC). Last year, you and your coworkers in Northeast Ohio donated over \$1.9 million to those in need. I thank you for last year's campaign donations and also thank you in advance for your participation this year. We at Glenn Research Center hope to make this year's campaign even more successful.

Either directly or indirectly, approximately one in four Americans receive benefits from a CFC Agency. If not a member of your immediate family, it may be a cousin, a neighbor, or a coworker who receives assistance through your donation.

Please consider making a contribution to the CFC through the biweekly payroll deduction plan. Contributions are, of course, tax deductible. They will begin in January of 2006 and will continue for only 1 year. Making a pledge is the easiest way to contribute and help those less fortunate than you. This year, Glenn employees will be able to make electronic pledges through WebTADS—making donating to CFC even easier than ever! Payroll deductions enable you to increase your donation because it is spread over the entire year.

You have the opportunity to choose from over 2000 local, national, and international charitable organizations. Each of these organizations meets the Office of Personnel Management guidelines for inclusion in the CFC Contributor's Guide. Please take



Dr. Earls

the time to use the online search (provided after indicating your donation amount) and determine the charitable organization or organizations to which you wish to donate. Remember, it is your decision. The CFC belongs to you, the Federal employee. If you prefer, printed brochures listing the charitable organizations are also available from your keyworker.

This year, I am honored to serve as the Northeast Ohio CFC Chair. I strongly believe that this program gives all of us an opportunity to help others. Your contribution will allow others to better face the future and have a better life.

In fact, "you are the key" as we continue to show the local community, the Nation, and the world that at Glenn Research Center, we care enough to share with those less fortunate. I thank you on behalf of those you help, who cannot thank you themselves. ♦

News Notes

LESA MEETING: LESA/IFPTE, Local 28, will hold its next monthly membership meeting on Wednesday, September 14, at noon in the Employee Center, room 101.

POW-MIA OBSERVANCE: Giles Norrington, a retired Navy captain who was a prisoner of war for nearly 5 years, will be the guest speaker at Glenn's Prisoners of War, Missing In Action (POW-MIA) Observance on September 16, from 1 to 2 p.m., in the Administration Building Auditorium.

THIRD SATURDAY AT VC: On Saturday, September 17, Glenn's Visitor Center (VC) will present "Cleveland's Aerospace History" from 9 a.m. to 4 p.m. During 11 a.m. and 1 p.m. presentations, visitors will discover Cleveland's role in the field of aerospace development, learn about NASA Glenn's involvement in X-planes, air races, and the aerospace industry. Other highlights include free photos available in the Picture Yourself in Space photo booth, kids make and take crafts, and plenty of handouts. For more

information and reservations for the presentations, call 216-433-9653 or visit <http://visit.grc.nasa.gov>.

HISPANIC HERITAGE OBSERVANCE: Lorraine Vega, senior vice president of Corporate Diversity with KeyCorp, will be the keynote speaker during Glenn's Hispanic Heritage Month Observance on September 21, at 9:30 a.m., in the DEB Auditorium. The event will also include Latin entertainment and refreshments.



Vega

FACILITY TOUR: The Zero Gravity Facility is the next public tour, scheduled for October 1. Tours are conducted every hour between 10:30 a.m. and 1:30 p.m., require registration, and are only open to U.S. citizens. For further information and to register, call 216-433-9653, or visit <http://www.nasa.gov/centers/events/tours.html>.

AFGE MEETING: AFGE Local 2128 will hold its next monthly membership meeting on Wednesday, October 5, at 5 p.m., at Denny's Restaurant, 25912 Lorain Road, North Olmsted. All members are encouraged to attend.

R&T REPORT: The 2004 Research & Technology (R&T) report selectively summarizes NASA Glenn's research and technology accomplishments. To obtain a hard copy or online copy, visit <http://www.grc.nasa.gov/WWW/RT/>.

GRANDCHILDREN CARE OPENINGS: Lewis Little Folks (LLF), Glenn's onsite child development center, is now accepting enrollment of grandchildren of NASA civil servant and support service contractors. There are currently openings in preschool and pre-K classrooms. Grandchildren will initially be enrolled on a first-come, first-serve basis in each age group where openings exist. After enrollment is filled, grandchildren will be placed on an auxiliary waiting list, which will be maintained separately from LLF's regular waiting list. For more information, contact LLF at 216-433-5264.



Glenn celebrates Return to Flight

Glenn's Visitor Center (VC) buzzed with excitement during NASA's Return to Flight (RTF) mission, STS-114. Beginning with the launch of the Space Shuttle *Discovery* on July 26 at 10:39 a.m. from Kennedy Space Center in Florida, and throughout the entire mission, the VC was a hub of activity.

"When *Discovery* lifted off, hundreds of researchers at Glenn felt the pride of being part of the team that helped make the shuttle a safer vehicle and return it to flight," said Angel Otero, chief of Glenn's Space Operations Division. "NASA as a whole has come to appreciate Glenn's expertise in mechanisms, gears, lubrication, high-temperature materials and impact testing and modeling. We have been working in these areas for the last 45 years to the benefit of the Agency. As a result of the *Columbia* accident, our capabilities were called upon again."

During *Discovery*'s 13-day mission, the VC opened its doors to the public with a series of talks about Glenn's role in preparing for RTF. Each afternoon from 2:30 to 4 p.m., visitors could view coverage of events on NASA TV and participate in daily talks with Glenn researchers. Topics ranged from Glenn's efforts on ice debris analysis, wind tunnel testing on protuberance air load ramps, payload experiments, and landing gear door seals.

"Clearly, the public was enthusiastic about the mission. They came not only for the launch and landing but also to hear the daily presentations by our researchers in the Visitor Center," said Katherine Martin, Media Relations Office. "Glenn's role in Return to Flight also received excellent coverage by the media during the entire mission." ♦

(1) Panelists Angel Otero, Programs and Projects Directorate; James Zakrajsek, Phil Jenkins, and Kim de Groh, Research and Technology Directorate, shared information on Glenn's role in RTF during a news conference in the VC. (2) Media visited Glenn's Ballistic Impact Laboratory. (3) Angel Otero shared highlights of Glenn's RTF contributions prior to launch. (4) Dr. Roy Sullivan, Life Prediction Branch, spoke about the application of foam insulation on the Space Shuttle's External Tank and research efforts conducted at Glenn on foam failure mechanisms. (5) The public gathered at the VC to cheer the launch of the Space Shuttle *Discovery*. (6) Jodie Beveridge and Brian McIntyre of Ohio News Network were among many news personnel who broadcast from Glenn. (7) During a presentation at the VC, Jeff DeMange, UNT/Mechanical Components Branch, used a balloon to relate the physics behind Glenn improvements to the seals around the main landing gear doors of the shuttle.



Photos by Glenn's Imaging Technology Center and AeroSpace Frontiers staff

Memento becomes official publication

Over the past 2 years, Matt Melis, Structural Mechanics and Dynamics Branch, has gained recognition from the Agency for his role in supporting the Agency's Return to Flight (RTF) effort. He and his team performed thousands of tests in Glenn's Ballistics Impact Laboratory to identify debris that could damage the reinforced carbon-carbon, a lightweight heat-shielding material that protects various shuttle parts.

Little did Melis know, however, that a RTF poster he designed as a memento for his

friend, STS-114 crewmember Charlie Camarda, would bring him additional notoriety.

The poster stirred so much interest on Lab and throughout NASA that Cheryl McCallum, (BTAS) Glenn's publications coordinator, rallied the support of Headquarters and assisted Melis in the process that enabled more than 100,000 copies of the RTF poster to be printed and distributed

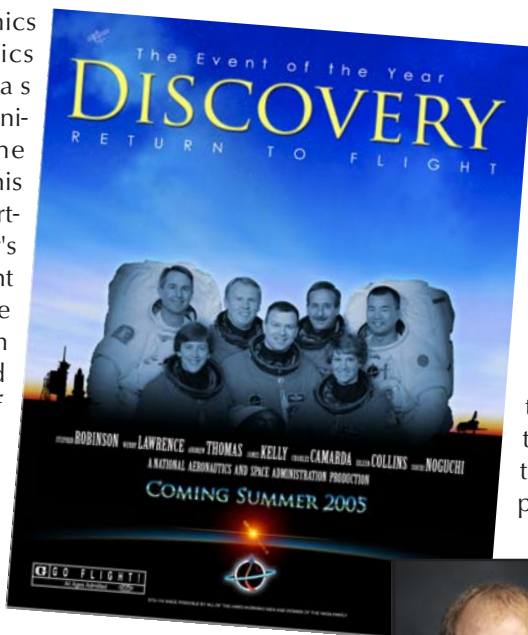
Agencywide. Melis attributes his artistic ability to a genetic trait he shares with his father

Melis



who is a professional artist. The motivation behind creating the RTF poster; however, belongs to him alone. Just like a movie preview display that draws attention to the latest summer attraction, the RTF poster features an "orbital" sunrise and the seven-member STS-114/Discovery crew looming on the horizon.

"Although I've witnessed many inspiring events that involved so many people who are focused on the same successful outcome, my motivating factors (in designing the poster) were based on my friendship with a crewmember, being a big fan of the Space Shuttle Program, and knowing that I've worked to the best of my ability to ensure a safe return to flight," Melis said. ♦



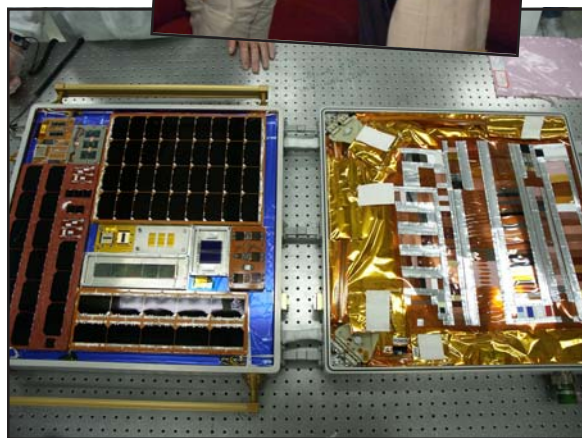
STS-114 carries special suitcase

When the Space Shuttle *Discovery* lifted off on July 26, it carried a number of experiments designed by engineers from NASA Glenn.

The Materials on the International Space Station Experiment (MISSE), a series of experiments that investigate the effects of long-term exposure of materials to the harsh environment of space, consists of a "suitcase" full of materials. During a spacewalk, an astronaut clamps the cases, called Passive Experiment Containers (PECs), to the exterior of the International Space Station (ISS). MISSE 1 and 2 were replaced with MISSE 5 during the *Discovery* mission. The samples will be returned to NASA Langley, where they will be opened in a clean room and contents distributed to the researchers for study.

The Forward Technology Solar Cell Experiment (FTSCE), included in the MISSE5 PEC, is a collaborative effort between Glenn, the Naval Research Laboratory, and the U.S. Naval Academy. The experiment places current and future generation space solar cells into the space environment to be tested for the first time.

Glenn also designed and built the electronics and wrote the software that will measure the solar cell performance on FTSCE. The electronics package will take solar cell measurements on command or autonomously, based on the Sun's position, the temperature, and the time. ♦



Above: Mike Piszczor, left, and Phil Jenkins (OAI), Power and Electrical Propulsion Division, share information on FTSCE with 90.3 WCPN's Karen Schaefer. Below: MISSE 5 PEC showing solar cell and material samples.

Technical specialists address occupational health concerns

Gayle Reid, chief of the newly formed Occupational Health Branch, believes that many employees take for granted a healthy work environment. She also thinks they may not have a full appreciation of the impact Occupational Health has on Glenn. People often associate the staff of the Occupational Health Branch as ancillary Safety personnel, when in fact their mission is quite different.

"Employees rarely concern themselves with the quality of our potable (fit for drinking) water or inside air or if the sound levels are high enough to cause hearing damage," she explained. "These concerns and many more are addressed on a daily basis by skilled and dedicated employees in the Technical Services (TS) group."

Under the Safety, Health and Environmental Division, Occupational Health Branch, Richard Miller, Joan Pettigrew, Donald Hicks, and Grace Jennings provide specialized technical services for all the division programs. This includes a variety of services such as inspections, sampling, and measurements for assessing hazard exposure of personnel.

The TS group addresses a variety of large, complex, and diverse programs that include the National Pollution Discharge Elimination System, Health Physics, Building Safety Inspection, Drinking Water, Hearing Conservation, Respiratory Protection, Ventilation Survey, Mercury Vapor Survey, and Instrument Calibration and Maintenance.



Photo by Doreen Zudell

Members of the Technical Services group, left to right, Miller, Jennings, Pettigrew, and Hicks sample onsite stormwater for chemical analysis according to the Environmental Protection Agency guidelines.

"Occupational Health uses practices and principles to prevent damaging

Continued on next page

Inspiring Scouts to explore at Jamboree

BY DOREEN B. ZUDELL

Did you know that 64 percent of NASA astronauts were Boy Scouts, 11 out of 12 men who walked on the Moon were Scouts, and hundreds of other employees have or continue to serve as Scout leaders?



Left to right: Stocker, Anderson and Baumann pictured in front of a NASA display depicting them and others as mentors. A NASA patch was also distributed to all Scout participants during the Jamboree.

Glenn helped strengthen NASA's connection to Scouting and inspired youth to consider technical careers by participating in the Boy Scouts of America's 2005 National Scout Jamboree, held July 25 through August 3 at Fort A.P. Hill, in Virginia. At the Jamboree, Scouts and leaders created a temporary "tent city" in 1 day and then enjoyed 9 days of activities that reflected the spirit and skills of scouting.

Glenn played a major role in the NASA exhibit, which had an estimated 50,000 visitors. David J. Anderson, Science Division; Eric Baumann and Bob Corban, Exploration Systems Division; and Dennis Stocker, Microgravity Division, joined employees from across the Agency in staffing the 40-by 40-foot exhibit that included a variety of science and exploration-related models and interactive displays.

Other NASA attractions included a solar system walk exhibit designed by Gayle DiBiasio, RSIS/Logistics and Technical Information Division, and Stocker; visits by astronauts Roger Crouch and Gregory H. Johnson; and the debut of a new Vision for Space Exploration exhibit, a 53-foot-long trailer designed to share with visitors NASA's exploration goal of returning to the Moon and then traveling to Mars and beyond.

"Boy Scouting offers a number of badges related to NASA's missions, such as Astronomy, Aviation, and Space Exploration. Perhaps more importantly, Scouts are strongly encouraged to explore, discover, and understand," explained Stocker. "Through our [NASA] participation, we hope to encourage Scouts to continue to learn about science and consider careers in science and technology."

For more information about the Jamboree, visit <http://www.bsajamboree.org/>. ♦

PEM fuel cell to be tested in new facility

A significant milestone in technology development for space exploration applications will be achieved with the testing of a Proton-Exchange-Membrane Fuel Cell (PEMFC) engineering model power plant.

The engineering model will be performance tested in a new state-of-the-art fuel cell test facility at Glenn. The facility, capable of testing various fuel cell types of 1 kW to 125 kW power, brings to NASA new and unique capabilities for the evaluation of fuel cells for future missions.

The PEMFC is an electrochemical power generation device that converts hydrogen and oxygen reactants into electrical power, heat, and water. Because the hydrogen and oxygen can be shared with propulsion systems and the water can be shared with crew life-support systems, fuel cells are an attractive primary power source for human space missions.

When fuel cells are coupled with an electrolyzer to form a regenerative fuel cell (RFC) system, the technology becomes an attractive energy storage alternative to battery systems, especially for lunar missions where the day-night cycles are much longer than those in low-Earth orbit.

"Proton-Exchange-Membrane Fuel Cells, as either a primary power source or part



Glenn Fuel Cell Test Facility, Building 334, with H₂, O₂, N₂ trailers to support PEMFC breadboard and engineering model power plant tests.

of a regenerative fuel cell energy storage system, are proving to be a leading technology for NASA Exploration missions," said Glenn Fuel Cell Technology Manager Mark Hoberecht, Power and Electrical Propulsion Division.

Upon completion of the testing at Glenn, the engineering model will undergo vibration and thermal vacuum testing at NASA's Johnson in Houston. At the conclusion of the test program, NASA will have demonstrated in a simulated flight environment that the technology is ready for application consideration in future space missions.

The engineering model was designed and built under contract by Teledyne

Energy Systems, Inc., and delivered in late July. It will be the first high-fidelity 12-kilowatt PEMFC hardware for space applications evaluated in a space flight-like environment.

Glenn is part of a team of NASA centers—Johnson, Kennedy, and Marshall—that has been developing PEM fuel cell power plant technology for future space missions. ♦

TS group on the job

Continued from page 8

biological effects for short- and long-term use of hazardous materials and sources," Reid explained. "Safety, on the other hand, refers to the acute (immediate) harm that can occur to an employee while performing certain tasks."

The TS staff is working to ensure that there is always a qualified occupational health specialist available to respond to a problem in any of these areas.

For further information on the TS group or questions or concerns about your work environment, contact the Occupational Health Branch at 216-433-3173. ♦

Portions of this article were contributed by Tony Christian, Environmental Management Office.

Check out Glenn's public Web site

Want to learn more about NASA Glenn? Check out the Center's public Web site at <http://www.nasa.gov/centers/glenn/home/index.html>.

Showcasing current features, news, and events, the Web site has something of interest to all ages. Read about Glenn's contributions to Return to Flight, Honor Award recipients, or view the latest images and video clips from our multimedia pages. Features highlight research being performed at Glenn, with in-depth interviews and related images, audio, and video clips. The "Events" section showcases our community spirit, Visitor Center programs, and exhibits throughout the community. The news pages include all Glenn's news releases, as well as the *Aerospace Frontiers* online!

Awards and Honors

The editors of *Science Spectrum* magazine recently announced the 2005 Minorities in Research Sciences Emerald Honors award winners who were recognized for their "exceptional talent and stellar achievement" in the research sciences. Among the top honorees are Glenn's Dr. Isaiah Blankson, senior scientist in the R&T Directorate, as Scientist of the Year; Dr. John Foster, aerospace engineer in the Electric Propulsion Branch, as Most Promising Engineer; and Dr. Jih-Fen Lei, deputy director of the R&T Directorate, as a special recognition honoree for her career achievements. The award recipients will be featured in the September issue of *Science Spectrum* magazine and honored during an awards ceremony and gala on September 17 at the Baltimore Convention Center.



Dr. Blankson



Dr. Foster



Dr. Lei



Photo by S. Jenise Veris

The Nano50 award-winning team includes, left to right, Dr. Maria Kuczmarski, Lynn Capadona, Dr. Chris Johnston, Dr. Michael Meador, Dr. Brian Good, and Dr. Nick Leventis. Not pictured: Dr. Mary Ann Meador, and Derek Quade.

Glenn's polymer cross-linked aerogels (reinforced aerogels) technology was among the inaugural class of the Nano50 Award winners announced by *Nanotech Briefs*, the first small-tech publication specifically for design engineers. The award recognizes the top 50 nanotechnology innovations by government, industry, and university with real-world applications in areas such as electronics, materials, sensors, manufacturing, biomedical, optics/ photonics, and aerospace/defense. These novel aerogels are being developed by a team (pictured) from the Materials Division for use in a variety of applications

including rigid insulation for cryogen propellant tanks and flexible insulation for extravehicular activities (EVA) space suits.

Promotion

Lori Pietravoia has been selected supervisor of the Program and Policy Office in the Office of Human Resources and Workforce Planning. Pietravoia also serves as the Center's Labor Relations officer. She brings to these positions a wealth of experience in human resources and labor relations from the Department of Labor and the Defense Contract Administration Services Regional Office, Cleveland. Since joining Glenn in 1990, Pietravoia has gained increasing responsibility and experience in the areas of classification, personnel management, and employee and labor relations that will be beneficial to her new endeavors.



Pietravoia

Correction

Deputy Director of NASA Marshall Charles Chitwood was incorrectly identified as John Horack in the August *AeroSpace Frontiers* under the "VIPs solar sails" caption on page 4 in "News and Events."

AeroSpace Frontiers is an official publication of Glenn Research Center, National Aeronautics and Space Administration. It is published the first Friday of each month by the Community and Media Relations Office in the interest of the Glenn workforce, retirees, Government officials, business leaders, and the general public. Its circulation is approximately 6700.

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DEADLINES: News items and brief announcements for publication in the October issue is noon, September 12. The deadline for the November issue is noon, October 14. Submit contributions to the editor via e-mail, doreen.zudell@grc.nasa.gov, fax, 216-433-8143, phone 216-433-5317 or 216-433-2888, or MS 3-11. Ideas for news stories are welcome but will be published as space allows. View us online at <http://AeroSpaceFrontiers.grc.nasa.gov>.



Landis named NASA-MIT Visiting Professor

NASA Glenn scientist Dr. Geoffrey Landis, Photovoltaic and Space Environments Branch, has been named the first Ronald E. McNair-NASA Visiting Professor of Astronautics at the Massachusetts Institute of Technology (MIT). An acclaimed MIT alumnus, Landis returns to teach a course on spacecraft design.

The professorship honors the memory of MIT alumnus Dr. Ronald E. McNair (Ph.D. 1976), an astronaut who was killed in the tragic explosion of the *Challenger* Space Shuttle, January 28, 1986, and builds on a long tradition of cooperation between NASA and MIT.

Landis, who earned his undergraduate degrees in physics and electrical engineering at MIT, is renown for his Mars expertise. He currently serves as a member of the science team for the Mars Exploration Rovers (*Spirit* and *Opportunity*) mission, and was a member of the 1997 Mars Pathfinder mission (*Sojourner* Rover). Outside of work, Landis has earned recognition as a science fiction writer and poet.



Dr. Landis

EASE counselor available onsite

Those wishing to speak directly to an Employee Assistance Program (EAP) counselor here at NASA Glenn may now do so. Clinical specialist Angela Gentile, LISW, is available to address employees' personal or professional concerns on Mondays, Wednesdays, and Thursdays from 8 a.m. to noon, and Tuesdays and Fridays from 12:30 to 4:30 p.m. in Building 15, room 105A. Her telephone number is 216-433-2989. Visit Today@Glenn for more information about Glenn's EAP



Gentile

program, including upcoming seminars for managers and staff. Glenn's point of contact is Tony Christian, Environmental Management Office. The Web site is located at www.easeatwork.com. Username: NASAGRC Password: EASE

Newsletter earns APEX award

Glenn's *AeroSpace Frontiers* newsletter has earned an Award for Publication Excellence (APEX) for the fourth year in a row. Editor Doreen Zudell and Assistant Editor S. Jenise Veris, SGT/Community and Media Relations Office, earned recognition for their coverage of Glenn's Journey to Tomorrow open house and technology showcase event.

The editors of *Writing That Works*, *The Business Communications Report*, sponsor the contest. APEX awards are based on excellence in graphic design, editorial content, and the ability to achieve overall communications excellence in print and electronic media.

For further information on APEX awards, visit <http://www.apexawards.com>. ♦

In Memory

Bonnie McBride leaves behind an industry standard

Bonnie McBride, 71, a physicist in the Combustion Branch, died on August 11, after a long illness. During her 48-year career with NASA, McBride earned numerous awards for her work including a NASA Honor Award for Exceptional Service in 1991 and a Federal Women of Achievement Award in 1985 from the Cleveland Federal Executive Board. She was also inducted into her high school's Hall of Fame as alumna of the year in 1995.



McBride

McBride spent her career at NASA working on thermodynamic databases and numerous versions of the NASA chemical equilibrium code that had been initially developed in the 1950s. She and her coworkers continually updated, improved, and provided support for these codes and databases. As a result, these codes have become an industry standard for the chemistry, combustion, and propulsion community. NASA's Inventions and Contributions Board named one of these codes, "Chemical Equilibrium with Transport Properties (CET89)," as one of NASA's Exceptional Scientific and Technical Contributions for the 1990s.

She was known and respected by her peers in and outside of NASA as a "kind, thoughtful, dedicated, and helpful colleague."

McBride received a bachelor's degree from Michigan State University in 1955 with additional course work at Wayne State, University of Toledo, and Cleveland State University. ♦

Richard George Daniels, 90, who retired in 1975 with 30 years of service, recently died. Daniels served as an aerospace services operator foreman prior to retirement.

Ronald Frimel, 73, who retired in 1994 with 40 years of service, recently died. Frimel worked as an electronic equipment fabricator prior to retirement.

Roy Themes, 86, who retired in 1979 with 32 years of service, recently died. He was a facility operator and construction inspector during his career. He served in the Army Air Corps during WWII.

In Appreciation

To my friends and colleagues at Glenn, thanks for all who crafted and attended my retirement picnic. It was a great send off enjoyed immensely by me and my family. Retirement is wonderful, but I do miss my friends at Glenn.

—James "Dude" Dudenhoeffer

I would like to take an opportunity to thank everyone who donated leave to me while my daughter, Emily, was recovering from the respiratory syncytial virus. She currently is in the process of healing from her heart surgery. Your generosity is greatly appreciated and will never be forgotten. We have been through a

rough few months, and your kindness, thoughts, and prayers have helped us get through this challenge.

—Angela Surgenor and family

Retirements



Paul Karla, Procurement Division, retired on July 31, 2005, with 35 years of NASA service.

Karla

New design concept smokes out false alarms

NASA researchers have successfully developed a new generation of fire detectors that could significantly reduce the rate of false alarms in the cargo and baggage compartments of commercial airliners.

The new sensor-based system developed at NASA Glenn under the Agency's Aviation Safety and Security Program (AvSSP), reads a more complete fire signature, and is so sensitive it may reduce false alarm rates to zero.

Most detectors sense the smoke particles coming from a fire—but where there's smoke there's not always fire. Dust and other aerosols that sometimes form in the cargo compartments can fool these sensors causing 100 to 200 false alarms for every actual fire, according to Federal Aviation Administration (FAA) surveys of airline reports. In-flight fires are rare, but there is no way for flight crews to verify sensor readings to know for sure a fire has started in a remote compartment. So every alarm must be taken seriously. This means using extinguishing equipment, declaring emergency priority over other

air traffic, and landing as soon as possible.

"When the Safety Program found that false fire alarms was an important safety issue it asked our sensor experts at Glenn to develop a solution, and they have exceeded our expectations" said Bob McKnight, AvSSP and ASP Projects Office. The team at Glenn used microelectromechanical systems (MEMS) expertise to come up with a new multi-sensor approach.

"We looked for increased concentrations of combustion gases along with the smoke," said Gary Hunter, Sensors and Electronics Branch. "The multi-sensor package uses new software and miniaturized sensors developed in the project to compare various gas concentrations and smoke particle sizes to those values characteristic of an actual fire. The result is a system that works to effectively recognize the presence of fire while screening out false alarms."



C-2005-1188

Photo by Marvin Smith

Glenn development team for the Microparameter Micro-sensor Fire Detection System from the following divisions: left to right, seated, Dr. Jennifer Xu, Instrumentation and Controls; Paul Greenberg, Microgravity; Michael Artale, SLI/Instrumentation and Controls; standing, Terry Ferrier, Engineering Development; Robert McKnight, Aeronautics; Dr. Gary Hunter, Instrumentation and Controls; and Drago Androjna, SLI/Instrumentation and Controls.

Tests conducted at the FAA Cargo Compartment Fire Testing Facility in Atlantic City, NJ, under false alarm and actual fire conditions, demonstrated the zero false alarm rate of NASA's new technology along with its ability to meet FAA required sensitivity to actual fire. Glenn researchers teamed with colleagues from Case Western Reserve University; The Ohio State University, Columbus; and Makel Engineering, Inc., CA, in collaboration with the FAA. ♦

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